

AMENDMENT – Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-17 (canceled)

Claim 18 (currently amended) An apparatus for measuring critical parameters used in manufacturing of ~~capital goods~~ semiconductor substrate in microelectronic processing without evasive interruptions to manufacturing equipment, the critical parameters selected from the group consisting of temperature, liquid and gas flow rate, distance, particles, humidity, pressure, viscosity, radiation, velocity, density, acceleration, stress/strain, pH, the critical parameters related to chemical/material analysis techniques selected from the group consisting of Energy Dispersive x-ray Spectroscopy (EDS), Cathodoluminescence (CL), X-ray Photoelectron Spectroscopy (*XPS*), Ultraviolet Photoelectron Spectroscopy (UPS), Auger, Electron Spectroscopy (*AES*), Reflection High Energy Electron Diffraction (REELS), X-ray Fluorescence (*XRF*), Photoluminescence (PL), Modulation Spectroscopy, Variable Angle Spectroscopic Ellipsometry (VASE), Fourier Transform Infrared Spectroscopy (FTIR), Raman Spectroscopy, Solid State Nuclear Magnetic Resonance (NMR), Rutherford Backscattering Spectroscopy (RBS), Elastic Recoil Spectroscopy (ERS), Ion Scattering Spectroscopy (ISS), Residual Gas Analyzer (RGA), Dynamic/Static Secondary Ion Mass Spectroscopy, Laser Ionization Mass Spectroscopy (LIMS), Sputtered Neutral Mass

Spectroscopy (SNMS), Glow Discharge Mass Spectroscopy (GDMS), Inductively Coupled Plasma Mass Spectroscopy, Inductively Coupled Plasma Optical Emission Spectroscopy, Neutron Diffraction, Neutron Reflectivity, Neutron Activation Analysis (NAA), Nuclear Reaction Analysis (NRA) and combinations thereof, the apparatus comprising:

one or more sensors, the one or more sensors attached to surfaces on the ~~capital goods~~ semiconductor substrate for collecting data therefrom;

an electronic device for processing data collected from the one or more sensors; and an energy source for the electronic device, wherein said sensors and electronic device reside completely on the surface of the ~~capital goods~~ semiconductor substrate.

Claim 19 (previously presented) The apparatus of claim 18 in which the electronic device comprises one or more of the following: an analog to digital converter, a signal conditioning device and a data recording device.

Claim 20 (previously presented) The apparatus of claim 18 further comprising an external wireless receiving module wherein the collected data is transmitted digitally in real-time from the electronic device to the external wireless receiving module, and wherein the data can be further utilized as desired.

Claim 21 (previously presented) The apparatus of claim 18 in which the electronic device further comprises a solid state memory device wherein the collected data is stored locally on the solid state memory device such that the data can later be downloaded and utilized.

Claim 22 (previously presented) The apparatus of claim 21 in which the solid state memory is selected from the group consisting of Electrically Erasable Read Only Memory, (EEPROM), Ferroelectric Random Access Memory (FeRAM) , Magnetic Bubble Memory, Flash, Dynamic Random Access Memory, Static Random Access Memory, First In / First Out (FIFO) and Giant MagnetoResistive Random Access Memory (GMR RAM).

Claim 23 (previously presented) The apparatus of claim 18 (currently amended) in which the energy source comprises a battery functional at elevated temperatures up to 150°C.

Claim 24 (previously presented) The apparatus of claim 23 wherein the battery is selected from the group consisting of lithium metal, lithium ion, and Nickel Metal Hydride (NiMH) batteries.

Claim 25 (previously presented) The apparatus of claim 18 further comprising an isolation material to protect the electronic device from hostile manufacturing or processing environments.

Claim 26 (previously presented) The apparatus of claim 25 in which the isolation material is selected from the group consisting of material with low thermal conductivity, material with low emissivity, and material with low convectivity.

Claim 27 (previously presented) The apparatus of claim 25 in which the isolation material is selected from the group consisting of silica aerogel, carbon aerogel, silica whiskers, vermiculite, stabilized zirconia, clay, and combinations thereof.

Claim 28 (previously presented) The apparatus of claim 25 in which the isolation material is a material with high resistance to chemical attack.

Claim 29 (previously presented) The apparatus of claim 25 in which the isolation material is a material with low permeability.

Claim 30 (previously presented) The apparatus of claim 18 in which the one or more sensors, electrical device and energy source operate in a vacuum.

Claim 31 (previously presented) The apparatus of claim 18 in which any one of the one or more sensors, electrical device and energy source are hermetically sealed, such that the apparatus is particularly adapted to operation in a vacuum environment.

Claim 32 (previously presented) The apparatus of claim 18 in which the one or more sensors, electrical device and energy source are radiation hard, for operation of the apparatus in environments containing radioactive substance.

Claim 33 (previously presented) The apparatus of claim 25 in which the isolation material isolates the one or more sensors, electrical device and energy source from

environmental radiation during operation of the apparatus in an environment containing radioactive substance.